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sequently being reduced. Nevertheless, the Pima still grow from three to five hundred acres of the native types, these plantings consisting of Pima soft white, Pima soft yellow, Pima soft blue, and Santan Yellow which is a hard flinty sort. The soft Pima varieties are not only popular for domestic use but have met with favor in some of the markets of the Salt River Valley. Many of the Pimas are able to secure substantial yields of both the native Pima soft kinds and Santan Yellow flint because of the short period required for maturing and low water requirement, only one irrigation being necessary. Development for the Pima, by the Field Station, of a sweet corn with relative freedom from corn earworm damage, has proved to be quite difficult.

Beans

Our investigations among the Pima-Papago reveal that they are now growing three species of beans: teparies *(Phaseolus acutifolius)*, kidney beans *(P. vulgaris)* and lima beans *(P. lunatus)*.[83] However, the relative antiquity of the three among these Indians is difficult to determine. Although Fewkes[84] reported finding beans (and maize) in an excavated room east of Casa Grande, an edifice occupied jointly by Hohokam and Pueblo peoples, a letter from J. E. Graf, of the Smithsonian Institution, where Fewkes' material is located, advises that neither the beans nor the maize mentioned are in the Smithsonian collections.

Kino, Mange and Velarde,[84] who visited Pimería Alta while both peoples were still on an aboriginal level, made frequent but indefinite reference to their growing *frijoles*. It is impossible to draw any conclusion regarding the kind or kinds of beans involved, and perhaps the best way to clarify

[83] For seed and vegetative differentia of the three species the reader is referred to: Bailey, *Manual of Cultivated Plants;* Hardenburg, *Bean Culture;* Piper, *American Phaseolineae;* Freeman, *Southwestern Beans and Teparies.*

[84] Fewkes, *Casa Grande*, p. 150.

[84] Bolton, *Kino*, I, 487, 195, 291; II, 207; Mange, *Luz*, pp. 217, 247-50, 256; Wyllys, *Velarde's Relación*, p. 128.

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the matter is by a process of elimination. Mention of the occurrence of the lima bean appears in only one ethnographical report on Southwestern tribes—that of Whiting[35] for the Hopi—and both he and Jones[36] regard it as apparently pre-Spanish among these Indians. As to the archaeology of the lima bean, on the basis of recent investigations at the Tonto Upper Ruin, it is now certain that this bean was grown in the Southwest aboriginally. The material from this site clearly indicates that *Phaseolus lunatus* was cultivated in the Salt River region on the edge of the Piman territory as early as the fourteenth century. A poorly preserved and incomplete specimen of charred cotyledons and pod fragments from the Wupatki excavation (dated 1168-1205 A. D.), about thirty-five miles northeast of Flagstaff and overlooking the Little Colorado River, was determined by Jones with some uncertainty as *P. lunatus*. If the lima beans found by Kelly[37] in a site near Tucson prove to be authentic as to archaeological context, the lima bean in the Southwest will thereby have further support for occurrence in the late twelfth or early thirteenth century.

The early historical accounts make no reference whatever to lima beans among the Pima-Papago, and in this connection it is significant that Freeman, who in 1910-12 investigated the native beans grown by these peoples, made no mention of the occurrence of the lima bean. Thus, in the absence of any specific archaeological or historical evidence among the Pima-Papago, it seems very doubtful that these people had the lima bean aboriginally. However, if opinions secured from informants, which represent Pima and Papago tradition, may be relied upon, it would be possible to conclude that the Pima had the lima bean earlier than did the Papago.

The problem, therefore, seems to resolve itself into a

[35] Whiting, *Ethnobotany of the Hopi*, pp. 12, 81.

[36] Steen and Jones, *Prehistoric Lima Beans in the Southwest*; Reed and Brewer, *Excavations of Room 7, Wupatki*.

[37] Steen and Jones, *op. cit.*, p. 200.

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question of whether the Pima-Papago had both tepary and kidney beans.

Among the references to beans by Kino, Mange and Velarde, only two are sufficiently specific to be of real value. Velarde came to Kino's mission of Nuestra Señora de los Dolores in 1702 or 1703 while the Pima-Papago were still on an essentially aboriginal level. In his *Relación*, written in 1716, he observed that "those who live here are called Papabotas, that is, Pimans who eat beans *(pimas fríjoleros)*, since their principal sowing is the bean called *japavi* . . ."[39] and a little further on said "The rest of the fruits of this Pimería are maize, the small bean called *tepari*, and other seeds . . ." Velarde's account here is somewhat confused and it leaves one at a loss to know whether he is writing of one or two kinds of beans being grown by the Papago. However, his reference to the "bean called *japavi* [papavi]" is evidently to the tepary bean, the Papago name for which is *pawi*, and from which these Indians received their nickname *papawi o' otam* (bean people). The name *papawi* comes from a Spanish pronunciation of the Papago phrase *t pawi*, "it is a bean." Another reason for believing Velarde's references are to the tepary bean is that the Papago name for the kidney bean is *mu:nyi*. Wyllys'[39] translation of the word *japavi* as probably meaning mesquite beans is, in our opinion, erroneous. The only other reference in the early accounts which may be interpreted as referring to the tepary is that of Mange,[40] who wrote of Indians on the Gila (Pimas and Yumas) giving his party "white beans." The absence of white kidney beans among the Papago-Pima today, and Freeman's[41] failure to encounter any when he studied the kidney beans and teparies of these tribes thirty years ago, indicate that white kidney beans at least are unlikely to be aboriginal among them and that

[39] Mange, *op. cit.*, p. 305; Wyllys, *loc. cit.*
[39] Wyllys, *loc. cit.*
[40] Mange, *op. cit.*, p. 265.
[41] Freeman, *op. cit.*

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Mange was undoubtedly referring to the white tepary. Moreover, the Spaniards complained that the Spanish (common or kidney) bean after being grown two or three seasons had a tendency to degenerate into the native tepary.[42] Russell[43] informs us that forty years ago the Pima were growing five kinds of beans, the first known being *tatcoa pavši* (white bean), doubtless the white tepary, which they regarded as having been brought from the Colorado River Valley in some forgotten time. Pima and Papago informants invariably regarded the tepary bean as an aboriginal, staple crop, and Freeman[44] was definitely of the opinion that it was ancient in cultivation among these peoples. Thus the historical data show quite conclusively that the tepary was being grown by the Pimans at the time of the arrival of the Spaniards.

Archaeological evidence also amply supports the thesis that occurrence of the cultivated tepary bean antedates the coming of white man in the Southwest, but just when it began to be grown in this area is a problem that awaits solution. In addition to the archaeological teparies known from the Gila Basin, and mentioned in Chapter III, the authors have seen the following specimens from the Southwest:

(a) Well-preserved teparies, both white and brown, from Kelly Cave on the San Francisco River, Catron County, New Mexico. About ninety pounds of these beans were found in a storage basket from the Eisele collection. Antiquity uncertain.

(b) White teparies from a cave in the Mimbres River area in southwestern New Mexico. Part of a cache of seventy-five pounds found by Berry Bowen in a large basket. Dating uncertain.

(c) Some white, some black, and some red and black

42 *Rudo Ensayo*, p. 156; *Documentos*, 3rd ser., IV, 511.

43 Russell, *Pima*, p. 92.

44 Freeman, *The Tepary, A New Cultivated Legume from the Southwest*, pp. 398, 400.

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in the mountains farther south, presumably in Sonora. Thornber[56] informs us that in 1914 he saw an astounding quantity of wild teparies growing near Santa Rosa, just south of the Santa Rosa Mountains on the Mexican border, and that a group of Papago women were gathering the ripe seeds. None of our own informants had any knowledge of the utilization of wild teparies.

From samples of cultivated tepary secured from the Papago and Pima, Freeman isolated and grew forty-seven distinct types, differing chiefly in flower color, and shape and color of seeds. Growth habit, foliage and pod characters of these types showed little difference, except that the white-seeded sorts had slightly smaller leaves than did those with yellow or darker colored seeds.

Both Papago and Pima had only two staple varieties of tepary—the white (really greenish white) and the brown. Black and variously speckled teparies also occurred but were rarely selected or grown as distinct varieties, and many Papagos and Pimas would pull up and discard such plants when found among crops of the white and brown ones. Informants of both tribes, with a single exception, regarded the brown as the oldest of the teparies. A present day factor which limits the growing of teparies is the commercial demand for only the white and brown varieties. The one most commonly found on the commercial market is the white, and this is often brought to trading posts for barter. Both tribes regard the white one as superior in taste and general quality to all the others.

That the kidney bean (*P. vulgaris*) was aboriginal in the Southwest is authenticated by its occurrence at a number of sites in the San Juan Basin belonging to horizons as early as Basket Maker III, such as those of Kidder and Guernsey.[57]

[56] J. J. Thornber, Professor of Botany, University of Arizona, Personal conversation, Apr. 28, 1940.

[57] Kidder and Guernsey, *Archeological Explorations in Northeastern Arizona*, p. 98.

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Moreover kidney beans were recovered by Haury[58] at the Canyon Creek Ruin near Roosevelt Lake on the fringe of the Piman territory, and are definitely known to have been grown by the Hohokam, in the Gila Basin (see Chapter III). Although we have no specific evidence that the Pima-Papago were cultivating kidney beans before the beginning of Spanish penetration into their area, it would be reasonable to suppose that they might have done so since they were cultivated by their neighbors and predecessors.

Freeman,[59] writing thirty years ago, was of the opinion that the kidney beans grown by the Papago and Pima were probably descendants of varieties introduced by early Spanish missionaries. On the other hand, Russell,[60] who worked among the Pima in 1901-02, states: "At least one variety of the common kidney bean, pole bean, bunch bean, etc., was known to the natives before the advent of the Spaniards." Since he gives no indication of the basis for his statement, little reliance can be placed upon it. Opinions secured by the authors from Pima-Papago informants as to the antiquity of the kidney bean are conflicting, the great majority of them regarding it as post-Spanish, a few pre-Spanish. One point in this connection is highly suggestive. Dr. Ruth Underhill, who has worked a great deal among the Papago and Pima, informs us that the Papago have growing songs for the tepary but not for the kidney bean. She has never heard more laughter evoked from a Papago group than when, as she was collecting growing songs, some wit suggested a song for the kidney bean. It was unthinkable!

Freeman[61] tested twenty-three distinct varieties of *P. vulgaris* obtained from the Papago-Pima about thirty years ago. He found the most commonly cultivated varieties to be the common Pink or Rosa bean; the Bayou bean; the Hansen

[58] Haury, *The Canyon Creek Ruin*, p. 59.
[59] Freeman, *op. cit.*, pp. 4, 11, 54-5.
[60] Russell, *op. cit.*, p. 76.
[61] Freeman, *op. cit.*, pp. 4-10, 15.

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bean, which from his description we take to be a striped Garrapata; the Mexican Tick bean or spotted Garrapata, of which he secured two distinct true-breeding strains; the Red or Colorado bean; and "mottled Red Indian beans" or red and white calico beans, which he found as pure field cultures among both Pima and Papago, although not a common sort.

In addition to these varieties, Freeman lists a number of miscellaneous forms found among the Pima and Papago which occurred only as mixtures with other varieties and were never found cultivated as pure varieties; but these on being isolated and grown were found to breed true.

The kidney beans *(P. vulgaris)* most commonly grown by the Papago at present are, in order of importance:

1. The common Pinto bean belonging to the Garrapata group.
2. The common Pink or Rosa bean (pink *frijole*). This was a staple crop among the desert Papago at least by 1918 when they grew 1,800,000 pounds.[82]
3. The Red or Colorado bean. Freeman reported this variety was grown sparingly thirty years ago by the Indians of southern Arizona, but that it was very popular in southern Sonora, where it quite largely replaced the Bayou bean for early spring planting. Our observation is that it is now quite commonly grown by the Papago on the Sells reservation.
4. A yellow self-colored strain of the Rosa bean (evidently the Bayou variety of Freeman). Our information agrees with that of Freeman to the effect that it is and has been extensively grown in northern Sonora.

A lima bean of the Hopi type was cultivated by the Pima for many years, although evidently not aboriginally. Between 1915 and 1930 it almost disappeared from the Gila River Indian Reservation and seldom was seen at the trading posts.

[82] *Report of the Commissioner of Indian Affairs* for 1919, p. 287.

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About 1930 the Coöperative Field Station at Sacaton began to select Indian lima types for adaptation to the warmer areas of the Southwest. Beginning in 1931, several color types were secured from the Hopi reservation, and the selected strains of white Hopi limas were obtained from the Agronomy Department of the University of California. In 1932 some samples of the Pima strain were secured which have been designated Pima-Hopi lima. Varying somewhat in color, this strain is typically light tan with black longitudinal markings. Selections were made from the strains and some improvement obtained in their ability to retain flowers and young pods during hot weather and to resist spotting of the young beans. The white strains show greater susceptibility to these disturbances than do the red, black and flecked ones. Nearly all the Hopi and Pima-Hopi lima strains show greater resistance to root knot nematodes than do the various common beans and teparies. Some of the vine types of limas are suitable as a summer cover crop and yield a greater tonnage of vines than do the teparies sometimes used for that purpose.[63]

The chief beans grown today by the Pima are teparies, Pima-Hopi limas and Mexican pink beans *(frijoles)*. Limas are seen in many colors but mostly brown or tan with purple longitudinal markings. These Indians occasionally try other commercial sorts but seldom have any success. The tepary continues to be a more dependable producer among the Pima and Papago than either kidney or lima beans.

Pumpkins

That the Pima-Papago were growing pumpkins as early as the time of Kino's arrival in Pimería Alta is well authenticated. Kino and Mange[64] refer a number of times to the cultivation and utilization of pumpkins *(calabazas)* by these

[63] King, Beckett and Parker, *Agricultural Investigations*, p. 58.

[64] Bolton, *Kino*, I, 187, 195, 246, 291; II, 207; Mange, *Luz*, pp. 217, 249, 256.

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peoples. The only other early reference is that of Velarde[65] who states that since the Spaniards had come into Pimería the Pimans grew pumpkins *(calabazas)* of various kinds. Complete lack of archaeological specimens of pumpkins in the area, going as far back as the Hohokam culture, renders it impossible to extend our knowledge of the existence of pumpkins among the Pima-Papago prior to Kino's day, even though all our informants regarded pumpkins as an ancient Piman crop. However, the occurrence of pumpkin remains *(Cucurbita Pepo* and *C. moschata)* in archaeological sites adjacent to the Piman area, such as the Tonto Ruin, the Canyon Creek Ruin and the upper Gila River is well established[66] (see also Chapter III).

Unfortunately the early historical accounts throw no light whatever on the kinds of pumpkins grown by the Pima-Papago. In our field studies three species were found—*C. moschata, C. Pepo* and *C. maxima*. The first was common everywhere among these tribes and consisted of several varieties, invariably regarded by informants as aboriginal. Both the buff and very dark green cheese pumpkins, usually with slender hard peduncles, were often found; these were commonly of cheese-box shape, occasionally oblong. But most abundant were the pear-shaped cushaws, with neck of varying length, in a variety of colors ranging from very dark green through yellow to netted and mottled green on a cream background. Many had corky longitudinal ridges on the neck and the peduncle was characteristically quite thick. Crookneck cushaws with strongly curved necks were seldom observed.

Although Papago and Pima informants frequently described an ancient pumpkin which gave every indication of being *C. Pepo*, it was only after long and diligent search that we finally found this species—at the Papago village of Big

[65] Wyllys, *loc. cit.*; Mange, *op. cit.*, p. 309.
[66] Hough, *Culture of the Ancient Pueblos of the Upper Gila River Region*; Haury, *loc. cit.*

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Fields, where two informants said their grandfathers had grown it; later we found it at Santa Rosa. All informants to whom it was shown regarded it as ancient. This was elongated in shape, averaging about fifteen inches in length by seven in width. The color was dark green with broad stripes of a lighter green mottled with gray. Informants said the reason it was not cultivated more widely was that it was good for roasting, but not satisfactory for drying and storing.

The third species was *C. maxima*, located among the Papago only at Big Fields, and here and there among the Pima. Informants invariably said this Banana squash at Big Fields was not a Papago type and had come into the village within the last thirty years; Pima informants also regarded varieties of this species as of recent introduction.

The above information on the three species of *Cucurbita* is in full agreement with Southwestern archaeological data in general, for numerous specimens of *C. moschata* and *C. Pepo* have been found in Southwestern excavations, but not a single archaeological specimen of *C. maxima* has ever been found in the Southwest, or for that matter in any area north of the interior of Mexico. Thus there is every indication that the Papago-Pima grew pumpkins aboriginally, both *C. moschata* and *C. Pepo* being cultivated before the coming of the white man. Russell[97] says that, according to tradition, the first Pima pumpkin (called *vsás katuk*) were obtained from the Yumas and Maricopas.

Cotton

Although investigators are not agreed that a continuity exists between the cultures of the Hohokam and their successors, the Pimans, archaeological specimens clearly show cotton was present at an early date in the Gila Basin. Fewkes found cotton at the Casa Grande ruin, and it has been reported from the Grewe site and McEwen Cave; Woodward has reported cotton seed and what appears to be impressions

[97] Russell, *op. cit.*, p. 91.

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deum vulgare pallidum typica Ser.). This is identical in type with the now widely grown variety of that name. The fact that it was found in twelve of the fourteen structures studied in Sonora, Lower California, California and southern Arizona, indicates a widespread culture in the region.

At present the Pima-Papago grow two varieties of barley, Common and Vaughn. The latter, a smooth-awned sort, is characterized by its consistently high yield and stiff straw. At the irrigated area of San Xavier the leading Papago crop is barley, harvested mostly for hay. Among the Pima and Papago barley is usually planted from November to January, although sometimes as late as February, and is grown almost entirely for pasturing cattle; this begins about six weeks after the crop is planted. Early sown barley, as well as wheat, sometimes has been reported as damaged by late frosts at San Xavier and on the Gila.

Watermelons and Muskmelons

Of the Old World crops introduced among the Pimans, watermelons originally ranked very high in importance. That their cultivation in places preceded Kino's arrival is clearly shown by the fact that in the fall of 1698 he encountered a group of Papagos at the village of San Angelo del Bótum (present day Cocklebur) who were growing watermelons, "although never in that village or in the others of this vicinity and coast had there entered another white face or Spaniard."[129] The culture of watermelons long since has become so thoroughly established among the Pimans that all our informants regarded them as aboriginal.

The significance of watermelons in Piman economy may be attributed to two things: their extreme fondness for them, and the fact that they may be stored until well into winter. Russell,[130] in 1908, observed that watermelons were among the most important crops of the Pima, who ate them at least

[129] Bolton, *Rim of Christendom*, pp. 387, 390-91.
[130] Russell, op. cit., p. 75.

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six months of the year. Today their cultivation is general throughout our area, and even the Papago are able to grow them under flood-water farming on the desert since they have varieties which are rather drought resistant. Informants said they could not have gotten along without the watermelon.

The earliest watermelons of which the Pimans had knowledge were of two kinds, one with pinkish, the other with black, seeds. One was spherical, about eight inches in diameter, of light greenish-gray color with broad stripes of darker green. The flesh was pink. The second was an oblong melon with white skin and pink flesh. Informants also spoke of an ancient yellow-fleshed variety. The common sort today is the spherical striped one, although occasionally modern varieties are seen. The Pima are still heavy growers and consumers of watermelons, damage from aphids being the limiting factor in their production. Varieties which do well at the Coöperative Field Station are Klondike, Striped Klondike, Angeleno, Klekley Sweet, Chilian, Irish Gray, Tom Watson, Stone Mountain and Georgia Rattlesnake.[121]

Indications are that the Pimans received muskmelons at essentially the same time they did the watermelon. Mange,[122] in company with Kino, wrote in 1697 that the Indians at San Agustín de Oiaur harvested muskmelons and watermelons *(melones y sandias)*; Anza[123] also reported them. However, the Pimans have never been fond of muskmelons, and this, coupled with unfavorable keeping qualities, is responsible for their lack of popularity. Some informants regarded the muskmelon as pre-Spanish, others held the opposite view. Russell[124] observed in 1902 that the Pima extensively raised muskmelons, but they are little grown by either the Pima or Papago today.

The oldest muskmelons were said to be of two sorts: an

[121] King, Beckett and Parker, *Agricultural Investigations*, p. 58.
[122] Mange, *Luz*, p. 256.
[123] Bolton, *Anza*, II, 18, 147.
[124] Russell, op. cit., p. 77.

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oblong fruit about twelve by eight inches, smooth skinned and not grooved. The surface was finely mottled light green, with greenish-white flesh. The other was ovoid, about twelve by six inches, smooth skinned but grooved lengthwise. The surface was a lemon yellow color, flesh rather cream colored, but not so good in flavor as the first. Both kinds were seen in Papago villages. At one village we found a third type of muskmelon unlike any we had ever seen. It was three and one-half inches long, two and three-fourths inches thick; burnt orange in color, with yellow stripes, and of excellent odor and flavor.

Cowpeas, Chick Peas, Lentils and Garden Peas

Although the Papago and Pima have grown the black-eyed bean or cowpea *(Vigna sinensis)*, the chick pea or garbanzo *(Cicer arietinum)* and the lentil *(Lens esculenta)* for a long time, and many consider them as aboriginal, they are Old World crops brought in by the Spaniards by way of Mexico. All three are still in cultivation among a number of Pima and Papago families. Both the small and large forms of the cowpea were and still are grown, although both tribes obtained the small variety first. Solid black seeds of this small form without any spot sometimes occurred, but these merely appeared among the black-eyed ones and rarely were grown as a separate variety; in fact, they were usually discarded entirely even in cooking. One Papago informant said they formerly grew a cream-colored cowpea with a brownish eye. We found in cultivation among the Papago a reddish-brown cowpea with a large white spot located at one end of the seed and not around the hilum as is the case of the ordinary black-eyed pea. This is a hybrid form which breeds quite true to type. Both Pima and Papago grow the garden pea *(Pisum sativum)* on a small scale at present.

The Windsor bean *(Vicia faba)*, also known as broad, horse or Scotch bean, was not grown by either people and none of our informants had ever seen it.

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CHILI

Chili *(Capsicum annuum)* was introduced among the Pimans by Kino[125] toward the close of the seventeenth century, but its cultivation was not taken over extensively. Only a few Pima grow it at present and it is cultivated by the Papago only in very favorable places. The chief variety grown is Anaheim.

Aboriginally, and even to the present, the Papago and Pima have used fairly extensively for seasoning the native, spherical, small-fruited, but very pungent, Bird Cayenne or Spur pepper *(Capsicum frutescens* var. *baccatum)*, commonly known in the Southwest and in Mexico as *chiltepiquín*,[126] which grows wild in moist places in the Baboquivari Mountains and southward in Sonora. It did not occur in Pima territory but was secured by trade with the Papago. It was never cultivated by either people. Papago made expeditions to secure *chiltepiquín;* they pulled up the entire plant which they brought home for drying, then picked the fruit and stored it in a sealed olla. They always arranged to have some on hand. Its early use in Sonora was described by Pfefferkorn.[127]

[125] Bolton, *Kino*, I, 122-23, 204, 248-49, 253, 321; II, 80, 100, 158, 165, 265.
[126] Also spelled *chiltipiquín, chilepiquín, chiltepín* and *tschiltipin*.
[127] Pfefferkorn, *Beschreibung der Landschaft Sonora*, I, 62-3.

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Paper bread was unknown to the Pimans. Corn pollen was never utilized, even ceremonially. One informant said that, as a boy, he used to see people putting ears heavily infested with corn smut on coals to roast, then taking off the smut and eating it without other preparation. The standard Pima meal consisted largely of cornmeal gruel.

Pumpkins

Time of Harvest

As indicated earlier in this chapter, the Papago made one planting of pumpkins—when the rains began in July, and this was harvested in October; the Pima made two plantings—the first when mesquite began to leaf out in spring, the second immediately after sahuaro harvest in July. The first sowing was harvested in late June, the second in October. All their varieties of pumpkins were sowed at the first planting, only cushaws in the second. Piman pumpkins were usually harvested after maize and teparies had been put away, for many were still unripe at the maize harvest. Color of the fruit indicated whether they were mature enough to be gathered, the cushaw type usually ripening first, the cheese pumpkin last. It was known that light frosts would do them no damage, so it was not necessary to bring them in before that time.

Method of Harvest

Anciently it was woman's work to gather the pumpkins. Varieties were sorted into separate piles in the field to avoid a second handling, then carried to the house in a burden basket. Neither Papago nor Pima left a portion of the vine attached to the fruit, as was done by some tribes, but in severing pumpkins from the vines care was taken not to break the fruit stalk away from the pumpkin itself, otherwise it would rot readily.

Storing

The average family had a crop of sixty to one hundred pumpkins, which were stored immediately after gathering.

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develop into fruits. A quantity was gathered early in the morning and, after removing the calyx, dried in the sun on a mat or cotton cloth for about three days, then stored in a sealed olla. When used they were cooked with mesquite beans. At times, they were mixed with cornmeal and boiled, the mixture spread out on grass or a cloth to dry for about three days, and stored in ollas. This was again boiled when utilized. Twisted flowers, after removal of the green calyx, were also boiled and eaten with pinole.

Papago and Pima regarded pumpkin seeds as a delicacy. These were parched by placing in a piece of olla with live coals, stirring until done, and eaten much as we eat peanuts; or at times these seeds were parched with corn.

Seed Selection

Pumpkin seed was selected in a general way (by either the man or woman) by simply taking those from the largest pumpkins, size being the most important criterion. Or, if a pumpkin proved to be especially sweet, the seed was saved. This was placed in a small olla with others of the same variety and, when sowing time came, a quantity was taken from the olla and planted without culling out individual seeds.

Teparies and Common Pink Beans

Time of Harvest

The Papago made only one planting of teparies—in July, and harvested in October. The Pima made two; their first planting, as mentioned earlier in this chapter, was made when mesquite began to leaf out, the second soon after sahuaro harvest. The first was mature in late June, the second in October.

Informants said if maize and teparies were planted at the same time the maize would be ready to harvest before the teparies, which required a minimum of ten weeks under favorable moisture conditions. They invariably matured

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less quickly than pink beans. However, they were not allowed to remain long in the field after ripening, due to possible damage by rain.

Method of Harvesting and Storing

The entire process of harvesting teparies and kidney beans, from pulling the vines out of the ground to sealing the seeds in ollas for storage, was regarded as women's work, although men might help if not otherwise engaged.

Brown and white teparies and pink beans were planted in separate plots and harvested separately. The plants were grasped just above the ground line, pulled up, roots and all, and placed in piles. They were then taken to the threshing floor and allowed to dry for from three to six days. The threshing floor was prepared either in the field or near the house by removing weeds from a designated area, then leveling. After it was swept clean it was hardened by tamping with the feet; if dry the soil was first moistened. All tepary vines of one variety, or the pink bean vines, were placed on this threshing ground in a pile and beaten with a pole (five or six feet long and about one and one-half inches thick) so as to knock the ripe pods off the vines. Vines were removed to one side of the floor and allowed to remain for several days to permit drying of pods not fully mature, then beaten a second time.

Pods were placed in small piles on a mat or cloth and beaten with a short stick, about two feet long, to release seeds from the hulls. Many hulls were blown out by the wind, and most of the remaining ones scraped away with the fingers. Final winnowing was done at the threshing floor by allowing the beans to fall gradually from a large shallow basket, held about four feet in the air, to a sotol mat or cotton cloth, most of the chaff meanwhile blowing away with the wind.

Pink beans were harvested in the same manner as teparies. They were said to be ripe when "the moon had gone around twice" after planting. At the home of informant

5: Castetter & Bell N-5 (1938-1940) 1942
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Gerónimo we observed his wife threshing pink beans in the field on a floor thirty-five feet in diameter. This floor was hard and somewhat depressed because of continued use over a period of years, and there was a pole in the middle to which horses were tied at the time of wheat threshing. Several piles of pink bean, as well as of tepary, vines were on the floor. She sat in front of one of the piles of pink bean vines and flailed it heartily with a stick about five feet long and one and one-half inches thick. After beating for a time she removed some of the vines, then beat again, and finally removed all vines from the pile to the edge of the floor. These vines, even after heavy beating, retained some immature pods, and were dried further before receiving a final threshing. Before she had finished her work for the day it began to rain, so the beans and pods were carried in flat baskets and cotton cloths into the house, the vines being left on the threshing floor.

Both winnowed teparies and pink beans were laid in the sun on a mat or cotton cloth for several days to dry fully, after which, among the Pima, they were stored in close-coiled baskets in the manner described for corn, or in ollas sealed with saline soil. All beans, regardless of kind, were sealed to protect them from mice, etc. Among the Papago, such baskets or ollas were covered with an old flat basket, or a piece of broken olla shaped to conform roughly to the opening, and sealed over with mud mixed with crushed mescal stalks or grass. Both peoples segregated, and stored in separate baskets or ollas, the different colors of tepary (usually only white and brown were grown), as well as common pink beans.

Yield

Teparies are very drought resistant, although they respond well to additional moisture. In periods of drought they often produce a good crop while common pink beans, or *frijoles*, under the same conditions, are a total failure. Teparies are also much more resistant to insect attacks than are pink beans. That they bear a considerably larger number

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of pods than do *fríjoles* is reported by Freeman,[13] whose experiments showed teparies yielded 450 to 700 pounds per acre by dry farming, compared with 800 to 1500 pounds when grown under irrigation; also that under all conditions teparies outyielded *fríjoles* often as much as four to one. There was no difference in the yield of different kinds of teparies.

Utilization

Dry teparies were customarily cooked by themselves and eaten, or cooked with roasted corn. Pink beans were not considered good unless cooked with meat, preferably fat, and, since this was not always available, their use was somewhat limited. Formerly, in times of food scarcity, women would go out into the field prior to the general harvest and gather such teparies as had already matured, but these were never cooked as green beans (i.e., both pods and seeds). *Fríjoles* were usually gathered only when ripe, then dried and stored, but on occasions of need were picked in the pod before ripe, and boiled.

All Pimans seem to prefer the taste and quality of the white tepary to that of the brown. However, there is a great deal of variability among individuals as regards preference between teparies and pink beans. There is little difference in the nutritive value of the two, although the tepary markedly surpasses the latter in rate and degree of swelling and of absorptive power when soaked in water; also the seed coat of the pink bean is heavier than that of the tepary.

Anciently there was little use for tepary and pink bean vines, although if building a house a person might place some on the roof and cover with dirt. Hulls were never utilized. At present the vines and hulls serve as fodder for cattle and horses.

[13] Freeman, *Southwestern Beans and Teparies.*

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Seed Selection

There was no seed selection of teparies or pink beans. Pi Pa 242
Seed to be planted was simply taken out of the general stored supply at planting time.

Cowpeas (Black-eyed Beans) and Lima Beans

With the coming of the Spaniards, cowpeas, which, despite their name, are more closely related to the beans than peas, were introduced among the Pimans. Planted by the Papago in July, and by the Pima in late March or early April and in some cases again after sahuaro harvest in July, the pods were harvested progressively as they ripened, since plants would grow indefinitely as long as weather conditions permitted, although quite susceptible to frost. Informants said one could begin picking the long pods about eight weeks after planting, those near the base ripening first. At the time of general harvest, the pods remaining on vines were still somewhat green, so the vines were piled and allowed to dry for a week or more before being threshed. Threshing was done by beating with a stick or, if the quantity were small, by hand. Pi Pa 244

Like black-eyed beans, the single sowing of lima beans (made by the Pima in late March or early April and by the Papago in July) was harvested progressively throughout the growing season as the pods ripened, and the growth of plants was terminated only by frost or lack of moisture. Among the Pima, whenever plants began to fall off in production of pods they were irrigated, whereupon a new crop began to set. The first pods were ready to pick when mesquite beans were fully ripe. Although limas stand drought well, their yield is closely associated with the amount of water they receive, hence, at present they are more extensively grown in the Pima than in the Papago country. Usually women picked the pods and shelled them by hand. However, when families grew a considerable quantity they were placed on the ground on a large cotton cloth and trampled out by foot. The

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empty pods were then removed by hand and seeds winnowed to remove chaff. The Pima now plant limas in June or July and they yield better if not irrigated too heavily.

Limas and black-eyed beans were usually planted in smaller amounts than teparies and pink beans, hence the quantity of seeds secured at any one picking was small.

As with teparies and pink beans, the harvesting of limas and black-eyed beans was accepted as woman's work.

Seed Selection

There was practically no selection of seed for limas or cowpeas, and seed to be planted was simply taken out of the general supply with no discrimination other than discarding shriveled ones. Informants said one never got poor seed of these crops unless it was immature as the result of injury by early frost. The only precaution was to use fresh seed, for it was known that these beans lost viability rather quickly.

Chick Peas and Lentils

Both chick peas and lentils were recognized by the Pimans as introduced crops. Pima and Papago grew chick peas, or *garbanzos*, to only a small extent, and lentils even less, although both were regarded as very nutritious. The chick pea is well adapted to arid and semi-arid regions and matures in about ninety days. Both Pima and Papago made a single planting, sowing them as a winter crop from November first to February and harvesting in April or May, consequently they required little moisture. It has been reported that *garbanzos* will endure a temperature of 13° F. without being injured. People began to harvest chick peas when mesquite beans were about ripe, and picked them progressively. The first pods to ripen were simply rubbed by hand. When the plants began to dry up, tops were cut off with a sickle or pulled up, piled and dried for a few days, then threshed by beating with a stick or trampling. They were then winnowed, dried further and stored in a sealed large gourd or olla. On

5: Castetter & Bell N-5 (1938-1940) 1942
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good soil a yield of one thousand pounds of chick peas per acre was not unusual. Pi Pa 244

Pima and Papago planted lentils as early as February, and they were ready to harvest in April or early May. Pima frequently made two plantings of lentils, the Papago but one; this second sowing was after sahuaro harvest. Like chick peas, they were fairly drought resistant. Lentils were harvested and stored in the same manner as teparies, and were reported as returning a yield of tenfold.

Cotton

Time of Harvest

Both Pima and Papago anciently made a single planting of cotton. Among the Pima this was done from late March to mid-April; the Papago planting was made as soon as the summer rains began, usually in July but at times later. Cotton took at least eleven weeks to mature but need not be picked until all other crops were out of the way, usually in late October or early November. Pi Pa 248

Method of Harvest and Storage

Anciently it was customary for the Pimans to gather their cotton and pile it in the boll on tops of houses, sheds or *ramadas* for drying. In this connection Emory[18] wrote, under date of November 11, 1846, that "The cotton has been picked, and stacked for drying on the tops of sheds." More recently, in harvesting Pima cotton, two ends of a cotton cloth have been tied over the shoulder, the cloth thus hanging at one side of the body constituting a sort of sack, and in this the bolls were placed as they were picked. They were then taken to the house and spread out on a cloth on the floor in one corner of a room. Only if the season were getting late and frost might kill plants were the stalks removed before bolls matured. Stalks were broken or cut off at ground level then placed on top of the house or a shed and the bolls allowed to

[18] Emory, *Notes*, p. 83.

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scarce when May came around, and it was common to gather matured heads of wheat, beat out the grains and eat them before the general harvesting was begun.

Watermelons and Muskmelons

Time and Method of Harvest

The Pimans were very fond of watermelons, moderately so of muskmelons. The Pima usually made two plantings of both, the first ready for harvesting in late June, the second in October, although muskmelons were a little later in maturing than were watermelons. The single Papago planting ripened in October. Watermelons were tested for ripeness by their sound when thumped; also they were considered mature when the tendril on the stem of the melon dried and curled up. However, they often were eaten before completely ripe. Ripening of muskmelons was determined by their odor and resistance to pressure. Pima informants said when the first planting of watermelons had matured the fruit was picked, then the vines irrigated and in about six weeks there was a second, although smaller, crop.

Either men or women picked the melons when harvesting, and put them in a pile. A few melons at a time were placed on a mat or cotton cloth laid on the ground, and carried to the house or storage pit, this usually being done by the men.

Storage

The Pimans stored a goodly supply of watermelons for winter use, but did not bury them in sand as did the lower Colorado River tribes, although informants had heard of the Yuma and Maricopa doing so. Formerly they were stored in the oval pit with gable roof as described under "Storage of Pumpkins," but more recently Pimans have used a cubical underground pit about four feet in each dimension, slanting inward at the bottom on all sides and built on a hill if possible. Poles were placed on the bottom of the pit and covered with cornstalks, on which were placed alternate

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melons did not constitute a staple but were considered more of a delicacy, being sweet and very palatable.

Chili

Chili (*Capsicum annuum*) is an introduced crop among the Pimans and is recognized by them as such, but its cultivation was not taken over nearly as extensively as among the Pueblo Indians, for example; only a few of the Pimas grew it and even at present it is not cultivated to any extent, for most of them purchase their supply. The chief variety grown today is Anaheim. Chili is grown by the Papago only in very favorable places, since it requires a more reliable source of water than is ordinarily found in Papago territory. These people continue to depend upon the wild *chiltepiquín* (see Chapter IV).

Pima made a single planting of chili, and this when mesquite began to leaf out in late March or early April. It was sowed in small vegetable gardens and harvested in early November. The ripe pods were pulled off by hand and the green ones allowed to remain if weather conditions indicated they might still ripen. However, if frost were indicated, the plants were cut off at the base and piled in the field, and many of the green pods would ripen there. Green fruits were often roasted, then peeled and eaten. At times these dried roasted fruits were stored in sealed ollas and when utilized were steeped in hot water to soften. Those that had not dried readily were tied into strings and hung outdoors, then stored in ollas when dry. Another way of preparing the unripe fruits was to roast and peel them, then pound in a mortar and shape into a large cake, which was dried for future use. When needed, a piece of the mass was broken off and utilized as seasoning.

Ripe fruits were spread on a cotton cloth on the ground or on a layer of sticks and allowed to dry for four or five days, being stirred occasionally to facilitate the process. When fully

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by Hrdlicka,[2] held by the Pima during the long dry spell ending in the spring of 1905, in which notched sticks of greasewood *(Sarcobatus vermiculatus)* were rubbed along smaller plain sticks.

A modification of the above was the performance of a growing season ritual, held just before crop plants began to set fruit. Singers lined up along the edges of a field, each equipped with a notched rasping stick of creosote which he drew over a plain, slender creosote stick. Starting at the western end of the field, the singers, led by a shaman, moved around its edge until they arrived at the eastern end, meanwhile accompanying noise of the rasps with singing. They used no other ceremonial equipment, and the purpose of the performance was to call upon higher powers to give the people a good crop of well-developed fruits.

Informants said that formerly there was more rain in the Papago and Pima country; the reason for this was that the world was then newer and had greater power, also that more rigid observance of the ceremonies increased the rain.

One of the important Papago group ceremonies was the harvest festival. The Papago villages in the Santa Rosa Valley held this ceremony of Vikita jointly at the end of November or in early December, presumably every fourth year (in the southern part of Papaguería every year). However, its actual occurrence at Santa Rosa depended largely upon a successful harvest rather than the passing of any stated interval. This festival has been described in some detail by Lumholtz, Mason and Davis,[3] although the ceremony discussed by Davis, held in August at Quitobaquito, in Sonora, was accompanied by the drinking of much sahuaro wine, a feature obviously missing in early winter at Santa Rosa. The purpose of this ceremony was to invoke the higher power to give the people a good crop, to bring rain, free

[2] Hrdlicka. *Notes on the Pima of Arizona*, p. 41.

[3] Lumholtz. *New Trails*, pp. 92-8; Mason. *The Papago Harvest Festival*; Davis. *The Papago Ceremony of Vikita*.

17:Castetter & Underhill N.E-5 (1931-1934) 1935
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CUCURBITS

Pumpkin, *kahri (Cucurbita pepo)*
Cushaw, Crookneck pumpkin, *caskate'ki (Cucunbita moschata)*
Muskmelon, *uuwi kahri (Cucumis melo)*
Watermelon, *kihpi (Citrullus citrullus)*

Both *Cucurbita pepo* and *C. moschata* are commonly regarded as aboriginal species among the Papagos, although this has not been definitely established. The Spanish records refer to the Pima-Papago people as growing *calabasas* (10, 18), a word which was used quite loosely in old Spanish writings to denote pumpkins, squashes, or melons. Mange (18), in 1697, spoke of *melones* (probably muskmelons) and *sandias* (watermelons) as growing on the Gila and it is quite possible that these were grown from seed given by Kino, since this was ten years after his arrival. Other authorities state that watermelons were given the Indians by the Spaniards (27). Pumpkins were planted in the rainy season with an invocation like corn. When harvested the rind was peeled off in a long spiral which was hung from the house roof to dry, after which it was tied into bundles and stored in jars. Muskmelons and watermelons are grown at only a few places, such as San Xavier, where there is plenty of water. No attempt is made to store them.

TOBACCO

Coyote tobacco, *wiupuri (Nicotiana trigonophylla)*
Yaqui tobacco, *wiiw (Nicotiana tabacum)*

The first species used was the native *Nicotiana trigonophylla*, which grows wild on Elder Brother's mountain and is still used to some extent. In addition to this the Papagos and Pimas, at least fifty years ago, were cultivating the common tobacco *(N. tabacum)*. Seeds of this Yaqui tobacco, as the Papagos called it, were probably traded from Mexico. These seeds, in the possession of old men who did the tobacco raising, were considered very valuable and sometimes given as gifts.